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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/809,891

03/26/2004

Fuja Shone

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7786

20987

7590

03/10/2005

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EXAMINER

BOOTH, RICHARD A

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/809,891	Applicant(s) SHONE, FUJA	
	Examiner Richard A. Booth	Art Unit 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 6-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>03/26/04</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of the first embodiment in the reply filed on 2/10/05 is acknowledged. The traversal is on the ground(s) that the first and third embodiments are not mutually exclusive. This is not found persuasive because if claim 1 which is generic to the first and third embodiments is found to be allowable, claim 6 will also be found allowable but until that time claim 6 will not be examined on the merits.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Hopper et al., U.S. Patent 6,406,960.

Hopper et al. shows the invention as claimed including a method of forming an oxide-nitride-oxide layer in a non-volatile memory device, comprising the steps of: providing a silicon substrate 16; forming a bottom oxide 28 on the silicon substrate; depositing a silicon-rich silicon nitride layer 30 on the bottom oxide layer; and performing an oxidation process to react with silicon atoms in the silicon-rich nitride

layer, so as to form a top oxide layer 32 (see figs. 1-4 and col. 4-line 10 to col. 5-line 59).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopper et al., U.S. Patent 6,406,960 in view of Sato, U.S. Patent 4,720,323.

Hopper et al. is applied as above but fails to expressly disclose wherein the silicon nitride layer is between 10 and 200 angstroms, wherein the oxidation process is conducted at a temperature between seven hundred and eleven hundred celsius, and where the top oxide layer is between twenty to two hundred angstroms.

Sato discloses a memory device with an ONO layer where the silicon nitride layer 39 has a thickness of 150 angstroms, where the oxidation process is conducted at nine hundred fifty celsius, and where the top oxide layer 40 is sixty angstroms (see col. 4-lines 53-64). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Hopper et al. so as to form the nitride and oxide layers at the thickness as suggested by Sato and perform the oxidation process at the temperature suggested by Sato because these are suitable temperatures and thicknesses for ONO dielectrics in memory devices.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hopper et al., U.S. Patent 6,406,960 in view of Chang et al., U.S. Patent 5,836,772.

Hopper et al. is applied as above but fails to expressly disclose wherein the bottom oxide layer is between 10 and 100 angstroms.


Chang et al. discloses wherein the bottom oxide layer in an ONO structure is between twenty-five to one hundred angstroms (see fig. 1). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Hopper et al. so as to form the bottom oxide layer to the thickness specified in Chang et al. because Chang et al. shows this to be a suitable thickness for the bottom oxide layer of an ONO structure in memory devices.\

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard A. Booth  
Primary Examiner  
Art Unit 2812

March 4, 2005